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"Reaffirmed 1983"

IS : 788 - 1971

*Indian Standard*

SPECIFICATION FOR  
INK, DRAWING, WATERPROOF, COLOURED  
( *First Revision* )

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INDIAN STANDARDS INSTITUTION  
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG  
NEW DELHI 1

Price Rs 5<sup>00</sup>

March 1972

# *Indian Standard*

## SPECIFICATION FOR INK, DRAWING, WATERPROOF, COLOURED ( *First Revision* )

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*Indian Standard*  
SPECIFICATION FOR  
INK, DRAWING, WATERPROOF, COLOURED  
( *First Revision* )

**0. FOREWORD**

**0.1** This Indian Standard ( First Revision ) was adopted by the Indian Standards Institution on 1 April 1971, after the draft finalized by the Inks and Allied Products Sectional Committee had been approved by the Chemical Division Council.

**0.2** This standard was first issued in 1955. In the original standard the colours of the drawing ink were not specified and this requirement was subject to agreement between the purchaser and the supplier. The Sectional Committee responsible for the preparation of this standard decided to revise it incorporating specific shades of colours of common use. Shade cards have been provided for comparison of colour. An accelerated ageing test has been incorporated and changes have been made in the methods of test and sampling procedure.

**0.3** Colour values of different shades have been given in the appendix for guidance of the manufacturer and the user. The colour measurements were made at the Department of Chemical Technology, Bombay, after the shades were approved by the Inks and Allied Products Sectional Committee.

**0.4** For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS : 2-1960\*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

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**1. SCOPE**

**1.1** This standard ( First Revision ) prescribes the requirements and the methods of sampling and test for ink, drawing, waterproof, coloured. It includes colours which are most commonly used.

\*Rules for rounding off numerical values ( revised ).

## 2. TERMINOLOGY

2.1 For the purpose of this standard, the definitions given in IS : 4724-1968\* and IS : 4395-1967†, in addition to the following, shall apply:

- a) *Drawing Paper* — Strong and close textured paper of varied qualities and surfaces used for drawing, capable of withstanding steel eraser ( see IS : 3064-1964‡ ).
- b) *Tracing Cloth* — A very fine plane-weave cotton fabric treated in a special manner to make it suitable for use as tracing drawings ( see IS : 2037-1962§ ).
- c) *Tracing Paper* — Paper sufficiently transparent to allow a design to be traced through the reproduced, and intended for this purpose.

## 3. TYPES

3.1 The material shall be of the following two types:

- Type 1 — Transparent; and
- Type 2 — Opaque.

## 4. REQUIREMENTS

4.1 **Description** — The material of Type 1 shall be a transparent solution of dye in a liquid medium. The material of Type 2 shall be a suspension of an opaque pigment ( if desired, a mixture of dye and pigment may be used ) in a liquid medium.

4.1.1 The material shall not have any adverse effect on the tuft of the artist's brush.

### 4.2 Sediment

4.2.1 Type 1 of the material shall show no settling of the pigment when kept undisturbed for two weeks.

4.2.2 Type 2 of the material shall show no appreciable settling of the pigment when kept undisturbed for 15 minutes after thorough shaking and mixing.

4.3 **Colour** — The material shall be, in addition to white, of the following colours which shall be matched visually with the standard shade cards

\*Glossary of terms relating to printing inks and allied industries.

†Glossary of terms relating to ink and allied industries.

‡Specification for hand-made drawing paper.

§Specification for tracing cloth.



attached at Appendix A:

- |                    |                  |                      |
|--------------------|------------------|----------------------|
| i) violet;         | v) blue green;   | ix) scarlet;         |
| ii) prussian blue; | vi) yellow;      | x) burnt sienna; and |
| iii) cobalt blue;  | vii) orange;     | xi) brown.           |
| iv) light green;   | viii) vermilion; |                      |

**4.3.1** The method of preparation of test samples is prescribed in Appendix B.

**NOTE** — For guidance, basic values of colours in terms of the trichromatic system recommended by International Commission on Illumination (CIE) have been provided in Appendix C.

**4.4 Waterproof Quality and Solvent Resistance** — The material shall satisfy the tests prescribed in Appendix D.

**4.5 Opacity and Transparency** — The material shall be classed as opaque or transparent on the basis of the test prescribed in Appendix E.

**4.6 Performance** — The material shall comply with the requirements of the test prescribed in Appendix F.

**4.7 Growth of Mould, Thickening and Separation of Pigments** — The material, when tested according to the method prescribed in Appendix G, shall not show any growth of mould, thickening or separation of pigments.

**4.8 Keeping Quality** — The material shall pass the accelerated ageing test described in 4.8.1.

**4.8.1 Accelerated Ageing Test** — Keep the ink, in sealed bottles, in an air-oven at a temperature of 55°C for a period of one month. After this period it shall not show any sign of deterioration.

## 5. PACKING AND MARKING

**5.1 Packing** — The material shall be packed in glass containers of 15 ml or 30 ml capacity or any other packing as agreed to between the purchaser and the supplier. It shall be furnished with a quill pen securely fixed to the cork sealing the phial, so as to reach the bottom of the phial. The cork shall be of plastic top which may be easily manipulated.

**5.2 Marking** — Each container shall be legibly marked with the following information:

- a) Name and type of the material;
- b) Colour;
- c) Volume in ml;

- d) Name of the manufacturer and/or recognized trade-mark, if any; and
- e) Lot number in code or otherwise to enable the batch and date of manufacture to be traced from records.

**5.2.1** The containers may also be marked with the ISI Certification Mark.

**NOTE** — The use of the ISI Certification Mark is governed by the provisions of the Indian Standards Institution ( Certification Marks ) Act, and the Rules and Regulations made thereunder. Presence of this mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard, under a well-defined system of inspection, testing and quality control during production. This system, which is devised and supervised by ISI and operated by the producer, has the further safeguard that the products as actually marketed are continuously checked by ISI for conformity to the standard. Details of conditions, under which a licence for the use of the ISI Certification Mark may be granted to manufacturers or processors, may be obtained from the Indian Standards Institution.

## **6. SAMPLING**

**6.1** The method of drawing representative samples of the material from a lot, the number of tests to be performed and the criteria of conformity of the material to the requirements of this standard shall be as prescribed in Appendix H.

# APPENDIX A

( Clause 4.3 )

## STANDARD SHADE CARD FOR WATERPROOF DRAWING INKS



Violet



Prussian Blue



Cobalt Blue



Light Green



Blue Green



Yellow



Orange



Vermilion



Scarlet



Burnt Sienna



Brown

**APPENDIX B***( Clause 4.3.1 )***PREPARATION OF TEST SAMPLES****B-1. PROCEDURE**

**B-1.1** Cut a strip of 150 × 40 mm from a filter paper of 80 g/m<sup>2</sup> and dip in the ink to a depth of 60 mm. After immersion for about half a minute, withdraw the strip from the ink and allow it to dry in air. Colour shall be matched visually on a portion at a distance of 25 mm above the bottom edge of the test strip.

**APPENDIX C***( Clause 4.3.1, Note )***COLOUR VALUES OF INK, DRAWING,  
WATERPROOF, COLOURED**

Sl No.	Drawing Ink Colour	CIE Units		
		<i>x</i>	<i>y</i>	<i>z</i>
(1)	(2)	(3)	(4)	(5)
i)	Violet	0.406	0.273	0.321
ii)	Prussian blue	0.321	0.316	0.363
iii)	Cobalt blue	0.299	0.271	0.430
iv)	Light green	0.418	0.475	0.107
v)	Blue green	0.307	0.414	0.279
vi)	Yellow	0.528	0.437	0.035
vii)	Orange	0.584	0.389	0.027
viii)	Vermilion	0.609	0.352	0.039
ix)	Scarlet	0.593	0.358	0.049
x)	Burnt sienna	0.512	0.412	0.076
xi)	Brown	0.488	0.410	0.102

## APPENDIX D

( Clause 4.4 )

### TEST FOR WATERPROOF QUALITY AND SOLVENT RESISTANCE

#### D-1. PROCEDURE

**D-1.0** The test shall be carried out with a clean line pen.

**D-1.1** Draw a few lines (0.5 mm thick, 5 mm apart and 150 mm long ) or figures or both on the matt side of (a) cellulose acetate transparent medium for tracing drawings, (b) drawing paper, (c) tracing cloth, and (d) tracing paper. Mark off the drawing into two equal parts, allow to dry for 12 hours and then subject to the tests given in **D-1.1.1** to **D-1.1.3**. Make the tests on sections selected from each one of the two equal parts.

**D-1.1.1** Place four drops of water and spread them over the drawing for a length of about 25 mm applying no rubbing or friction. Allow the drawing to dry normally. There shall be no spreading of ink nor shall it show more than a faint stain.

**D-1.1.2** Soak the drawing for a length of about 25 mm with water by a sponge and then blot it with a clean piece of blotting paper. There shall be no stain on the blotting paper.

**D-1.1.3** Place four drops of petrol, benzene or carbon tetrachloride and spread them over the drawing which has been allowed to dry for a further period of 12 hours, to a length of about 25 mm applying no rubbing or friction. Repeat the operation if necessary to keep the surface wet for at least 5 minutes. There shall be no spreading of ink or reduction of colour.

## APPENDIX E

( Clause 4.5 )

### TEST FOR OPACITY AND TRANSPARENCY

#### E-1. PROCEDURE

**E-1.1** Draw lines 3 mm wide or figures with black waterproof drawing ink (conforming to IS: 789-1971\*) on white drawing paper. Then draw

\*Specification for ink, drawing, waterproof, black (first revision) (under print).

with a brush, stripes 10 mm wide with the material over the black lines or figures.

**E-1.1.1** If the black lines or figures show clearly through the coloured stripes the material shall be classed as transparent ink; if the coloured stripes substantially obliterate the black lines or figures the material shall be classed as opaque ink.

## **A P P E N D I X F**

*( Clause 4.6 )*

### **TEST FOR PERFORMANCE**

#### **F-1. PROCEDURE**

**F-1.0** The test shall be carried out with a clean line pen.

**F-1.1** Set the pen ( preferably with an opening of approximately 0.08 mm ) and fill it with sufficient ink to draw a few lines or figures or both ( preferably more than 5 lines, each about 150 mm long and about 5 mm apart ) on the matt side of (a) drawing paper, (b) tracing cloth, (c) tracing paper, and (d) cellulose acetate transparent medium for tracing drawings. The ink shall be considered unserviceable if it is not possible to draw sharp and well defined edges, without special effort to promote the flow of the ink.

**F-1.2** Draw on the matt side of a drawing paper, tracing cloth, tracing paper and cellulose acetate transparent medium for tracing drawings, five lines or figures ( preferably 0.1 mm thick, 150 mm long and 5 mm apart ) and also similar set of lines or figures ( preferably 0.5 mm thick ). The lines shall be clean, unbroken, of uniform width, and free from bleeding or feathering. There shall be no noticeable difference in intensity or shade of colour between the fine and coarse lines.

**F-1.2.1** Four minutes after the lines or figures have been drawn, rub them with finger tips previously washed with ethyl ether. There shall be no blurring or smudging. They shall also be free from a tendency to flake off.

**F-1.2.2** Cut the paper and the cloth upon which the test under **F-1.2** has been made into six strips at right angles to the lines drawn thereon. Keep one strip each of drawing paper, tracing cloth, tracing paper and cellulose acetate transparent medium away from light and fumes for comparison with the tests under **F-1.2.2.1**.

**F-1.2.2.1** Expose one strip each of the drawing paper, tracing cloth, tracing paper and cellulose acetate transparent medium placed at a

distance of about 250 mm from an ultraviolet lamp, normal to the rays, for a total period of 36 hours at room temperature. The lamp shall be of 125 watts, and long wave UV region chiefly at 3 655 Å°. All colours with the exception of green and violet shall show no evidence of fading when compared with the original strips. Green and violet shall show no fading after exposure for 24 hours when placed at a distance of 250 mm.

**F-1.3** Erase with an eraser, a reasonable length of a line, say, 25 mm in length and 0.5 mm in thickness, drawn on the matt side of the tracing cloth and tracing paper.

**F-1.3.1** The ink shall be regarded as not acceptable, if it is not possible to secure complete erasure without leaving any stain.

## APPENDIX G

( Clause 4.7 )

### TEST FOR GROWTH OF MOULD, THICKENING AND SEPARATION OF PIGMENTS

#### G-1. PROCEDURE

**G-1.1** Transfer 5 ml of the material into a 50-ml beaker and inoculate with a mixture of spores of (a) *Aspergillus niger*, (b) *Pullularia pullulans*, and (c) *Penicillium pinophilum*. Keep in a moist chamber for two weeks at  $37 \pm 1^\circ\text{C}$ . After the expiry of this period, the ink shall not show any growth of mould, thickening or separation of pigments.

## APPENDIX H

( Clause 6.1 )

### SAMPLING OF INK, DRAWING, WATERPROOF, COLOURED

#### H-1. GENERAL REQUIREMENTS OF SAMPLING

**H-1.0** In drawing, preparing, storing and handling test samples, the following precautions and directions shall be observed.

**H-1.1** Samples shall not be taken in an exposed place.

**H-1.2** The sampling instrument shall be clean and dry when used.

**H-1.3** Precautions shall be taken to protect the samples, the material being sampled, the sampling instrument and the containers for samples, from adventitious contamination.

**H-1.4** To draw a representative sample, the contents of each bottle selected for sampling shall be thoroughly mixed.

**H-1.5** The samples shall be filled in clean, dry, air-tight glass containers on which the material has no action.

**H-1.6** The sample containers shall be of such a size that they are almost completely filled by the sample.

**H-1.7** Each sample container shall be sealed air-tight with a stopper after filling, and marked with full particulars of the material as given in 5.2 and the date of sampling.

**H-1.8** Samples shall be stored in such a manner that the temperature of the material does not vary unduly from the normal temperature.

## H-2. SCALE OF SAMPLING

**H-2.1 Lot** — All the bottles of the same size in a single consignment containing ink of one type and from the same batch of manufacture shall constitute a lot.

**H-2.1.1** Samples shall be tested from each lot for ascertaining the conformity of the material to the requirements of the specification.

**H-2.2** The number ( $n$ ) of bottles to be chosen from a lot shall depend on the size of the lot, and shall be in accordance with Table 1.

**TABLE 1 SCALE OF SAMPLING**

LOT SIZE	NO. OF BOTTLES TO BE SELECTED
( $N$ )	( $n$ )
(1)	(2)
Up to 15	2
16 „ 50	3
51 „ 150	5
151 and above	8

**H-2.3** These bottles shall be chosen at random from the lot and to ensure randomness of selection, random number tables shall be used ( *see also* IS : 4905-1968\* ). In case such tables are not available, following procedure may be adopted:

Starting from any bottle count them as 1, 2, 3, etc., up to  $r$  and so on, in one order. Every  $r$ th bottle thus counted shall be withdrawn to give a sample for test, where  $r$  is the integral part of

\*Methods for random sampling.



$N/n$  ( $N$  being the lot size and  $n$  the number of bottles to be chosen from the lot).

### H-3. TEST SAMPLES AND REFEREE SAMPLES

**H-3.1** Before drawing the samples, the material in the bottles chosen (see H-2.2), shall be thoroughly mixed by shaking or stirring or rolling. Samples shall then be drawn with the help of a suitable sampling instrument.

**H-3.2** From each of the bottles three test samples shall be drawn, the volume of each sample being sufficient to conduct all the tests specified in 4.1 to 4.8. All the test samples thus obtained shall be transferred to sample containers (see H-1.5) and marked with all the details of sampling (see H-1.7). These samples shall then be separated into three identical sets of test samples in such a way that each set has a test sample representing each bottle selected (see H-2.2). One of these three sets shall be for the purchaser, one for the supplier and the third for the referee.

**H-3.3 Referee Sample** — Referee sample shall consist of the set of test samples (see H-3.2) marked for this purpose and shall bear the seals of both the purchaser and the supplier and shall be kept at a place agreed to between the two.

### H-4. NUMBER OF TESTS

**H-4.1** Tests for all the requirements of the specification, given in 4.1 to 4.8, shall be conducted on each of the samples in a set.

### H-5. CRITERIA FOR CONFORMITY

**H-5.1** A lot shall be declared as conforming to the requirements of the specification if each of the test result satisfies all the relevant requirements of the specification individually.

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